IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method of forming a microstructure, the method comprising:

providing a substrate;

forming a diffusion filter layer on the substrate;

depositing a high-k layer onto the diffusion filter layer; and

performing an oxidation process during and/or after said depositing wherein an interfacial oxide layer is grown between the diffusion filter layer and the substrate, the interfacial oxide layer growth being controlled by the diffusion coefficient of the diffusion filter layer.

2. (Original) The method according to claim 1, wherein the diffusion filter layer comprises at least one of a nitride layer, an oxynitride layer, or combinations or mixtures thereof.

3. (Original) The method according to claim 2, wherein the diffusion filter layer is formed in a nitridation process comprising at least one of thermal nitridation, direct plasma nitridation, remote plasma nitridation, plasma enhanced nitridation, UV nitridation, and radical flow nitridation.

4. (Original) The method according to claim 3, wherein the nitridation process is carried out on a SiO_2 layer.

5. (Original) The method according to claim 3, wherein the nitridation process is carried out in a nitrogen-containing environment comprising at least one of NO, N_2O, NO_2, N_2, and NH_3.

6. (Original) The method according to claim 5, wherein the nitrogen-containing environment further comprises an inert gas.

7. (Original) The method according to claim 3, wherein the nitridation process is carried out at a substrate temperature below about 1000° C.

8. (Original) The method according to claim 2, wherein the diffusion filter layer is deposited onto the substrate in a deposition process.

9. (Original) The method according to claim 8, wherein the deposition process comprises at least one of TCVD, PECVD, and ALD.

10. (Original) The method according to claim 1, wherein the thickness of the diffusion filter layer is less than about 10 A.

11. (Original) The method according to claim 1, wherein a combined thickness of the diffusion filter layer and the interfacial oxide layer is less than about 20 A.

12. (Original) The method according to claim 1, wherein the oxidation process utilizes an oxygen-containing gas comprising at least one of O_2, O_3, H_2O, H_2O_2, NO, NO_2, and N_2O.

13. (Original) The method according to claim 12, wherein the oxidation process further comprises an inert gas.

14. (Original) The method according to claim 1, wherein the oxidation process is carried out at a substrate temperature between about 300° C and about 1000° C.

15. (Original) The method according to claim 1, wherein the oxidation process is performed in the absence of an oxygen-containing gas.

16. (Original) The method according to claim 1, wherein the high-k layer comprises a metal oxide.

17. (Original) The method according to claim 16, wherein the metal oxide comprises at least one of Ta_2O_5, TiO_2, ZrO_2, Al_2O_3, Y_2O_3, $HfSiO_x$, HfO_2, $ZrSiO_x$, $TaSiO_x$, $SrSiO_x$, and LaO_x.

18. (Original) The method according to claim 16, wherein the high-k layer is deposited in the presence of an oxygen-containing gas.

19. (Original) The method according to claim 1, wherein the high-k layer is deposited in a deposition process comprising at least one of TCVD, PECVD, ALD, and PVD.

20. (Original) The method according to claim 1, wherein the thickness of the high-k layer is less than about 30 A.

21. (Original) The method according to claim 1, further comprising forming an electrode layer on the high-k layer.

22. (Original) The method according to claim 21, wherein the electrode layer comprises at least one of poly-Si, W, Al, TaN, TaSiN, HfN, HfSiN, TiN, TiSiN, Re, Ru, and SiGe.

23. (Original) The method according to claim 22, further comprising thermally annealing the electrode layer.

24. (Original) The method according to claim 1, wherein at least one of the diffusion filter layer and the interfacial oxide layer is formed by a self-limiting process.

25. (Original) The method according to claim 1, wherein the substrate comprises at least one of a semiconductor substrate, a LCD substrate, and a glass substrate.

26. (Original) The method according to claim 25, wherein the semiconductor substrate comprises at least one of a Si substrate and a compound semiconductor.

27. (Original) The method according to claim 1, further comprising:
determining a diffusion coefficient of the diffusion filter layer;
determining the thickness of the high-k layer; and
selecting an oxidation process recipe.

28. (Original) The method according to claim 1, further comprising at least one of performing a preclean process on the substrate and performing a surface preparation process on the diffusion filter layer.

29. (Original) The method according to claim 1, further comprising determining the characteristics of at least one of the substrate, the diffusion filter layer, the high-k layer, and the interfacial layer.

30. (Original) The method according to claim 1, wherein the oxidation process is performed during the deposition of the high-k layer.

31. (Currently Amended) The method according to claim ~~31~~ 30, wherein the oxidation process occurs in the presence of an oxygen-containing gas.

32. (Original) The method according to claim 30, wherein the oxidation process occurs in the absence of an oxygen-containing gas.

33. (Original) The method according to claim 1, wherein the diffusion filter layer further controls dopant and interlayer diffusion across the diffusion filter layer.

34. (Withdrawn) A processing tool for forming a microstructure, comprising:

at least one processing system for forming a diffusion filter layer on a substrate, depositing a high-k layer onto the diffusion filter layer, and performing an oxidation process, wherein an interfacial oxide layer is grown, the interfacial oxide layer growth being controlled by the diffusion coefficient of the diffusion filter layer;

a transfer system configured for transferring a substrate; and

a controller configured to control the processing tool to cause said performing to occur during and/or after said depositing.

35. (Withdrawn) The processing tool according to claim 34, wherein at least one of the processing systems comprise at least one of a single wafer processing system and a batch type processing system.

36. (Withdrawn) The processing tool according to claim 34, wherein said at least one processing system also performs a preclean process on the substrate and a processing system for performing a surface preparation process on the diffusion filter layer.

37. (Withdrawn) A processing tool for forming a microstructure, comprising:

means for forming a diffusion filter layer on a substrate;

means for depositing a high-k layer onto the diffusion filter layer;

means for performing an oxidation process, wherein an interfacial oxide layer is grown, the interfacial oxide layer growth being controlled by the diffusion coefficient of the diffusion filter layer.

means for transferring the substrate; and

means for controlling the processing tool so that said performing occurs during and/or after said depositing.

38. (Withdrawn) The processing tool according to claim 37, further comprising at least one of means for performing a preclean process on the substrate and means for performing a surface preparation process on the diffusion filter layer.